leave so much to be settled by the Statutory Commission that the ultimate character of the University is still very doubtful. Though non-federal in theory, it may be practically federal in fact, and it behoves those who are interested in the matter to do all in their power to protect it from the grave dangers which will beset the earliest stages of its career. The position assigned to Teachers, though not exactly that claimed by the Association, is so strong and so dignified that on this point we hope there will be no further controversy.

To sum up. Putting aside the relations of the University to Theology, Medicine, Law, and Music, the scheme of the Commissioners is the Revised Scheme, improved and modified so as to be much more closely in accord with the ideas of the Association. The question as to whether the University is, as far as Arts and Science are concerned, practically a federation of Colleges, is left to a Statutory Commission to decide. The main danger with which the University is threatened is jealousy between semi-independent Colleges. The only safeguard against this which the Commissioners suggest is that they take it for granted that everybody concerned will do his best "for the progress of knowledge." To which we heartily say "Amen."

STEREOCHEMISTRY.

Handbuch der Stereochemie. Unter Mitwirkung von Dr. Paul Walden herausgegeben von Dr. C. A. Bischoff. I. Band. (Frankfurt: H. Bechhold, 1893.)

STEREOCHEMISTRY grows apace. The birth of this youngest scion of the chemical family, which occurred about twenty years ago, when Van't Hoff and Le Bel published almost simultaneously their now famous memoirs, was not greeted with universal acclamation. The event excited at the time but little interest among English chemists, and when the young science was introduced, through F. Hermann's *Lagerung der Atome im Raume*, to the acquaintance of our German colleagues, it was regarded not without suspicion in some quarters. There was one chemist of high rank who denounced the *Chimie dans l'Espace* as "fanciful nonsense," as the outcome of "a miserable speculative philosophy, whose treatment of scientific subjects is not many degrees removed from a belief in witches and spirit-rapping." Stereochemistry, however, soon found a congenial home in the German laboratories, and flourished marvellously. About four years ago the young stripling was duly christened by Victor Meyer on the occasion of an address to the German Chemical Society, and thus received formal recognition as a legitimate member of the chemical family. Since then three general treatises have been called for in order to chronicle the progress of this latest development of chemical science—the "Chemistry in Space" of Van't Hoff, translated into English and re-edited by J. E. Marsh; Meyerhoffer's "Stereochemie," a later translation into German of the same work with much additional matter, and the admirable "Grundriss der Stereochemie," by A. Hantzsch. Following quickly in the wake of these, we have, in the "Handbuch der Stereochemie," a much more elaborate and complete treatise, chiefly from the pen of Dr. C. A. Bischoff, whose well-known indefatigable labours in the new field of research eminently qualify him for the serious task he has undertaken.

As explained in the publishers' announcement, stereochemistry has extended with such rapidity in recent years, and the numerous theoretical and experimental researches in this department are dispersed throughout so many different periodicals and pamphlets, that it is not easy for anyone who has not closely followed the subject from the outset, to obtain a general view of the development and present stand-point of the science. The object of the work before us is to remove this difficulty, and to attract more adherents to the new study. The book is further intended to exhibit the present position of all the problems which have been touched by stereochemistry, and to furnish a brief record of all the compounds which have any relation to optical and geometrical isomerism, so that it may serve as a convenient and reliable work of reference to the investigator.

The first volume of the treatise, extending to about 450 closely printed pages, comprises a general part, entitled "Die historische Entwickelung der Principien der Stereochemie," and the first subdivision of a special part, dealing with the relations of stereochemical theory to the phenomena of optical activity in organic compounds. The second volume, which is to appear shortly, will contain the remaining two subdivisions of the special part, which are to treat respectively of geometrical isomerism, and of the influence of intra-molecular space relations on chemical reactions.

The book has two distinct aims, which it is not easy to combine. As a work of reference the "Handbuch," we believe, fulfils all its claims, and will supply a much-felt want. The matter throughout is well up to date, the references to literature are copious, and the systematic account of all the known optically active organic compounds, which occupies more than half the volume, is the only complete collection of the kind we have at the present time. The organic chemist will understand the force of the commendation when we describe the book, from this point of view, as a *stereochemical Beilstein*, which will be indispensable in every laboratory where stereochemical research is being conducted. With respect, however, to the other purpose of the book, that of presenting a general picture of the development and present position of the science, the result is less satisfactory. The general part, which, judging from its title, was written with this end more particularly in view, is somewhat disappointing. The history of stereochemistry is an extremely fascinating subject; it contains all the elements of a good sensational scientific story, mysterious facts, wild speculations, ingenious hypotheses, beautifully verified predictions; but the subject as here presented is, to our mind, rather dry. The title of the chapter indicates that the development of the principles of stereochemistry is to be brought prominently into view; but we shall be surprised if the student, unless he is already pretty familiar with the literature of the subject, does not rise from its perusal, so bewildered in a maze of subtle speculation and conflicting hypothesis, as to conclude that stereochemistry has really no principles to develop. The introduction into a work of this kind of the speculation and hypothesis, to which stereochemical

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discovery has given such a wonderful impulse, is of course not only justifiable, but highly necessary at the present stage. It is not to this, nor to the matter of the book generally, which indeed is admirably selected, that we venture to take objection, but rather to the method of treatment. The method adopted in the general part is not calculated in our opinion to present a history of the development of the subject in a striking and lucid manner. The chapter really consists of a series of abstracts of memoirs, ranging over the whole field of stereochemistry, placed in chronological order of publication, to which the author seldom adds expository or critical remarks. The paucity of experimental facts in illustration of the theories described, adds still further to the unattractiveness of the picture. The author, it is true, expressly states in the preface that details have been intentionally omitted, but the unavoidable result is that the abstracts are in many cases so bald as to be shorn of much of their interest, and the often repeated reference to the special part for application of the theories described becomes tantalising. Stereochemistry has already in the short period of its existence pushed its way in so many different directions, that to present an effective picture of its growth, it would be necessary to trace its development along a number of more or less independent lines. The opening chapter of the special part, we ought to state, supplies this want to a great extent with respect to optical isomerism, and similar sketches will, no doubt, be given in the other subdivisions.

The idea that the relative position of atoms in space within the molecule, must be an important factor in determining the properties of compounds, was, no doubt, present to the minds of many of the founders of the atomic theory, and it is interesting to learn from a correspondent in these columns (vol. xlix. p. 173) that Wollaston had a very clear conception of this fact. The history of stereochemistry, however, begins with Pasteur, and we are glad to see that the importance of his experimental discoveries and far-seeing predictions receive ample recognition. A portrait of the veteran chemist is placed opposite the title-page, with that of his younger colleagues, Van't Hoff and Le Bel.

As is generally known, these two distinguished chemists arrived at their fruitful theory of the asymmetric carbon atom by two entirely different paths, and their positions with respect to it are by no means identical; indeed, Le Bel has entered a protest on several occasions against his views being confounded with those of Van't Hoff. The disadvantage of the chronological method, to which we have alluded, is very apparent here, for to form any adequate idea of Le Bel's present stand-point, the reader has to hunt up the summaries of various papers which are scattered throughout the general and special parts. The views held by Le Bel are particularly interesting, as they lead him to sundry fundamental conclusions, which must seem very heretical to those who have adopted the doctrine of Van't Hoff without qualification into their chemical creed. Thus he has recently concluded that even a molecule of the type CR_4 does not necessarily possess a configuration which can be symbolised by a regular tetrahedron, and that the usually accepted argument for the symmetrical distribution of the four hydrogen atoms in the molecule of marsh gas, based on the existence of only one monoderivative, is unsound. The experimental ground of his conclusion is the more interesting, as it furnishes one of the few instances in which the obvious property of the crystalline form of a compound has been used for the purpose of determining its molecular configuration. He finds in fact, contrary to Wislicenus' prediction with respect to compounds of the type indicated, that carbon tetrabromide does not crystallise in the regular system. Again, Le Bel's views do not exclude the possibility of optical isomerism in unsaturated bodies, and he finds indeed that solutions of citraconic acid become strongly active when mould is grown in them; should this discovery prove to be due to the production of an active isomeride of this acid, the discovery would revolutionise an important branch of stereochemical theory. Such considerations remind us that the prevailing stereochemical theories, fruitful as they have been, are nevertheless only a first approximation to the truth, and will have to undergo important modifications with the progress of discovery.

The reader of Dr. Bischoff's book will find abundant food for reflection in the numerous monographs, of which very good abstracts are given. Many of them, dealing with such fundamental subjects as the nature of chemical affinity, valency, the significance of double and treble linkage, the influence of the form and motion of atoms on chemical action, are highly interesting and suggestive; some of these papers will be already familiar to the readers of the *Berichte* and *Annalen*, but others which have been published in separate form are not readily accessible to the English chemist. The perusal of the opening chapter will convince the reader that stereochemical conceptions are already initiating a searching revision of the very foundations of the chemical edifice, and that they are destined in the near future to play an important, perhaps a predominant, part in the progress of chemical theory.

We may add that the book is abundantly illustrated with geometrical figures, and that a detailed index is promised with the second volume.

We have observed the following misprints: "symmetrischen" instead of "unsymmetrischen" in the last paragraph, p. 24; "+" instead of "×," p. 97; "Nachwirkung" instead of "Nahewirkung," p. 121.

T. P.

MARINE BOILERS.

Marine Boiler Management and Construction. By C. E. Stromeyer. (London: Longmans, 1893.)

THE difficulties attending the economic management of marine boilers have engaged the serious attention of engineers for many years, and Mr. Stromeyer's book will be welcomed as by far the most valuable addition which has been recently made to the subject.

The author treats in detail the generally accepted plans for the construction and methods of management of marine steam generators, and discusses, more or less fully, the causes of corrosion and other sources of wear and tear in boilers. Fuels and the conditions of heat transmission through plates are treated at length, whilst in the latter portion of the book, strength of materials

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